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Landscape Change and Livestock in Sixteenth-Century New Spain: The Archival Data Base

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ABSTRACT.

Despite the wealth of Mexican archival data pertinent to understanding the ecological interaction between livestock and landscape during the sixteenth century in New Spain, some fundamental methodological issues persist in the use of the mercedes, or land grants. The degree of completeness of the extant mercedes record and the de facto areal extents of the cattle and sheep estancias both remain uncertain. A cartographic method applied to mercedes for the central Veracruz lowlands addresses those issues and suggests a general method for rigorous analysis of the data base. That method demonstrates that the extant mercedes provide a nearly complete record and that the de facto areal extents of the estancias fairly closely reflected the legal stipulations.

Factual data, precisely localized, of enumerations of persons and goods, of land titles, assessments, production, lie neglected in various archives to await exploitation. There is an embarrassment of such riches in the old Spanish records for New Spain....

(Sauer 1941, 13).

Sauer surely had little cause for embarrassment—certainly not for the riches, but neither for their scholarly neglect. True, the Mexican archives do contain a wealth of data pertinent to a spatial perspective on long-term ecological change. True, no one with a sensibility for landscape and ecology had by 1941 systematically engaged those data. Yet those were years of exploration and discovery, for the gleaning of the pithy fragments which would frame the great research problems of succeeding

generations. And we, at present, surely have little reason for embarrassment either. Despite the ample squinting and scribbling involved in working with sixteenth-century paleography, Mexicanist geographers have labored diligently to increase understanding of sixteenth-century landscape change, as a series of regional monographs well demonstrates (e.g., West 1949; Barrett 1970; Trautmann 1981; Murphy 1986; for reviews of the field: Robinson 1989; Butzer 1992).

Lesley Byrd Simpson, the prodigious Berkeley “historian,” first took up the challenge to relieve his colleague’s embarrassment by systematically analyzing the land grants preserved in the Archivo General de la Nación (AGN).¹ The resulting monograph, published in the *Ibero-Americana* series, provided the first quantitative overview of the spatial distribution of livestock during the early colonial period, a fine complement to Chevalier’s contemporaneous socioeconomic history (Simpson 1952; Chevalier 1952). Those two seminal works have provided the impetus for a series of subsequent studies which contribute more particular, regional understandings (Prem 1978; Licate 1981; Melville 1983; Piñón Flores 1984; Widmer 1990; Sluyter 1995).

Yet, despite that growing literature, some fundamental methodological issues remain unresolved regarding use of the land grant documents to reconstruct landscape change. While researchers have employed several methods, uncertainty persists as to the completeness of the record, the areal extent

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represented, and the head of livestock represented. A test of a cartographic method employing data for the central Veracruz lowlands addresses the first two of those three issues and suggests a general method for rigorous analysis of the land-grant documents.

PERSISTENT METHODOLOGICAL ISSUES

The primary data base for studies of the interaction between livestock and landscape in sixteenth-century New Spain consists of the volumes in the *ramo* Mercedes of the AGN (Simpson 1952; Chevalier 1952, 1963; Prem 1978, 1988; Sluyter 1995). The Kraus collection of the Library of Congress in Washington and the Ayer collection of the Newberry Library in Chicago each contain an additional volume of *mercedes*, or viceregal land grants (LOC-Kraus, ms. 140; NLC-Ayer, ms. 1121). The two errant volumes and AGN-Mercedes primarily contain grants for farmland and livestock *estancias* but also for building lots and other land uses. The volumes also contain *mandamientos acordados*, the viceregal writs ordering inspections in response to requests for grants, and other documents related to land tenure and use. The grants for livestock *estancias* specify the date of the award, the awardee, the location, the number of land units, and whether the land units were for *ganado mayor* or for *ganado menor*. *Ganado mayor* grants imply cattle, unless specified as being for horses or mules, and had a *de jure* area of 1,747 ha and a minimum stocking rate of 500 head. *Ganado menor* grants imply sheep, unless specified as being for goats or pigs, and had a *de jure* area of 776 ha and a minimum stocking rate of 2,000 head. As Sauer (1941) surmised, the richness of that data base should permit a comprehensive, quantitative analysis of space-time changes in livestock numbers for comparison with field and archival indications of ecological change.

Analyzing that data base, however, entails addressing three thorny methodological issues, all of them apparent to Simpson (1952) from the outset. First, the extant *mercedes* in AGN-Mercedes, LOC-Kraus, and, NLC-Ayer might represent only a fraction of all the grants that the scribes originally recorded in the viceregal register. Second, the *de facto* areas of the grants might not have been the *de jure* 1,747 ha for *ganado mayor* and 776 ha for *ganado menor*. Third, the *de facto* stocking rates might not have been the *de jure*, minimum rates of

500 head for *ganado mayor* and 2,000 head for *ganado menor*. Without resolution, all three issues compromise any archival analysis of the ecological interactions between livestock and landscape.

Regarding the completeness of the extant record, LOC-Kraus, ms. 140, NLC-Ayer, ms. 1121, and AGN-Mercedes, vols. 1–35 and 84 roughly span the first century of Spanish colonization and contain some 10,000 land grants (Simpson 1952). However, while informal granting by local *cabildos* began during the 1520s and formal granting by the viceroy began during the 1530s, the viceregal scribes only began to keep the *mercedes* register in 1542, two decades after the Spaniards first introduced livestock and a century before land granting was to virtually cease (Chevalier 1952, 67, 120; Doolittle 1987). Six further lacunae, totaling thirteen years, occur between 1542 and 1620: 1544–1546, 1557, 1562, 1569–1571, 1578–1580, and 1610–1611 (Prem 1988, 130). Moreover, due to the simultaneous use of several register volumes and due to possible loss of some but not all of those parallel volumes for any given period, even years with some extant grants might not necessarily indicate complete, or even good, preservation. Indeed, the occasional copies of *mercedes* which do not appear in AGN-Mercedes but do appear in other documents, such as the tenure litigations in AGN-Tierras, indicate the incompleteness of the AGN-Mercedes register. In addition, Cortés and his heirs rather than the viceroy made grants, actually perpetual leases, within the Marquesado del Valle, and those *censos* do not appear in AGN-Mercedes (García Martínez 1969). *Estancias* as a whole, of course, only represent capitalist enterprises; individuals kept small numbers of subsistence livestock on non-*estancia* lands (Gibson 1964, 345).

Regarding the areal extent of the land units, despite a few references in the archival documents to circular *estancias* (AGN-Tierras, vol. 3460, exp. 2, ff. 10–14v; vol. 3185, exp. 2, ff. 62–63v), viceregal *ordenanzas* of 1536, 1567, 1574, and 1580 clearly specify north-south oriented squares (Galván 1851, 123–141, 166–167; Hackett 1923, vol. 1, 178–182; West 1949, 120; Sluyter 1995, 546–553). The *de jure* *estancia* was 5,000 *varas*, or one *legua legal*, on a side for *ganado mayor* and 3,333 *varas* on a side for *ganado menor*. Simpson (1952, 21) infers that “each *estancia* was surrounded by a belt of open

land at least double the size of the piece granted" because those same ordinances stipulate that estancias for ganado mayor must be one league apart and estancias for ganado menor one-half league apart. That stipulation, however, might well refer to the distance between the *casas y corrales* idealized as being at the centers of estancias and thus makes no provision for buffer space between estancias. Nonetheless, because of rudimentary surveying, de facto estancias could only have approximated the stipulations of the ordinances.

Regarding the stocking rates, the specified 500 head of cattle and 2,000 head of sheep were the minima necessary to secure and retain tenure—to "prove up," in the dialect of another frontier. While some interpretations characterize those figures as *the* legal stocking rates, as if they were the maximum "prescribed stocking rates" (Butzer and Butzer 1993, 93; Butzer and Butzer 1995, 156), the mercedes themselves clearly treat those figures as *minimum* "improvements" (AGN-Mercedes, *passim*). Multiple examples illustrate how de facto stocking rates often exceeded the de jure minima, sometimes by an order of magnitude (Simpson 1952, 13; Morrissey 1957, 24–29). While the following analysis most directly addresses the first two of the three methodological issues, of the completeness of the archival record and of the areal extents of the land units, the issue of stocking rates entails a related solution (Sluyter 1995, 659–675).

METHODOLOGICAL PRECURSORS

Deductive Methods

Two deductive methods have emerged to address the issue of completeness versus incompleteness of the archival record. Both methods assume that AGN-Mercedes preserves only a fraction of the original grants. Both attempt to deduce the number of non-extant grants from the number of extant grants.

Simpson (1952), assuming that years with zero-to-few grants in AGN-Mercedes represent lost volumes, interpolates between "years of fullest coverage." He then employs the interpolated data to derive correction factors for each class of grant for all of New Spain between 1536 and 1620: extant grants + 40.5 percent for "Spanish cattle grants," + 25 percent for "Spanish sheep grants," and + 26.3 percent for "Indian sheep grants." Given Simpson's frustratingly brief explanation of the method,

replication on the basis of his highly aggregated data remains illusive. He further proposes correction factors to account for additional under-representation in AGN-Mercedes: + 6.86 percent for sheep estancias in Tlaxcala; + 5.45 percent for censos within the autonomous Marquesado del Valle. Again, the vague correspondence between Simpson's data and conclusions, even between his in-text calculations and tabular summaries, does not encourage confidence. Nonetheless, Simpson estimates that for all of New Spain only 75 percent of the mercedes for livestock and agriculture granted between 1536 and 1620 are preserved in AGN-Mercedes. And, as a final correction factor, he derives the areal extent of livestock estancias in 1620 by multiplying the number of grants in each class by the de jure area for that class, summing the products, and multiplying by three—a final "correction" based on his inference that "each estancia was surrounded by a belt of open land at least double the size of the piece granted."

Prem (1978, 1988, 1992) proposes an alternative deductive method. He reasons that since the vice-regal scribes recorded the mandamientos acordados and the mercedes in the same volumes, the probability of preservation should be the same for those writs which actually resulted in grants as for the grants themselves. Therefore, the extant documents of AGN-Mercedes "se pueden tratar como distribución binomial" (Prem 1988, 131). In other words, the number of extant writs with corresponding extant grants divided by the number of extant grants should equal the number of extant grants divided by the unknown, original number of grants. For the eastern Basin of Puebla, that quotient is 0.6, and the deduced, original number of grants is 256 (Prem 1992, 449). Prem (1978, 131) concludes that for the period 1587–1620 only 60 percent of the livestock and agricultural grants are extant in AGN-Mercedes.

Both of those deductive methods have serious limitations. Efforts to reconstruct the record by interpolating between years with seemingly fullest coverage ignore the possibility of real fluctuations in granting due to changes in political and economic context, including complete cessation of granting in some years. Assuming that the proportion of extant writs which actually resulted in grants equals the proportion of extant grants seems a dubious stretch of logic: arguable and possible, certainly; demonstrable and plausible, hardly.

Inductive Methods

Intensive study of regions within New Spain permits two inductive methods that avoid the limitations inherent in the deductive methods: first, recovering copies of mercedes preserved elsewhere than AGN-Mercedes; second, cross-referencing estancias that lack extant mercedes but receive mention as bordering estancias, or *linderos*, in extant mercedes.

Several researchers working at a regional scale have searched out copies of mercedes in addition to those preserved in AGN-Mercedes (Prem 1978, 1984, 1988, 1992; Licate 1981; Melville 1983, 1990, 1994; Piñón Flores 1984; Widmer 1990; Sluyter 1995). Copies of mercedes appear in regional archives and in other sections of the AGN—such as AGN-Tierras, where litigants in tenure disputes entered copies of their original grants into evidence. Some of those copies preserve mercedes not extant in AGN-Mercedes. Unlike studies at the scale of New Spain, which have typically relied on microfilm copies of AGN-Mercedes, regional studies permit the intensive archival work necessary to search, network, and cross-check several archives. Much relevant documentation remains “en las partes aún inexploradas, y que son muy grandes, del [AGN], o tal vez de otro archivo,” and a thousand AGN-Tierras volumes remain entirely uncataloged (Melville 1983, 82; Martínez 1992, 132). Only research in those archives themselves, as opposed to reliance on the incomplete microfilm copies held by various North American institutions, will uncover documents and insights which extend Simpson’s and Chevalier’s seminal research.

Intensive regional studies also permit cross-referencing estancias that themselves lack extant mercedes but receive mention as *linderos* in extant mercedes (Melville 1983, 1990, 1994; Butzer and Butzer 1993). For the Valle de Mesquital, Melville (1983, 80) infers fully 56 percent of her claimed total of 776 sheep estancias on the basis of mention as *linderos*. The proportion of grants Butzer and Butzer (1993, 93) infer to “compensate for the lost titles” in the Bajío remains unclear, their publications thus far being previews of an eventual monograph rather than detailed data presentations (Butzer and Butzer 1995, 153). Regardless, the assumption that an estancia belonging to an Hernando Hernández mentioned as a *lindero* in an extant merced represents a “lost” grant

simply because no grant in the name of Hernando Hernández remains extant seems fraught with hazards. Most essentially, many grants changed owners soon after award, legally or illegally, and mentions of such estancias as *linderos* in subsequent mercedes name the current owner rather than the original grantee. The names of estancias—often quite generic, such as El Hato Grande or El Rincón—also changed and provide but tentative identifications. Melville thus might have inferred many more grants than ever existed and grossly overestimated the number of estancias, counting the same location several times over simply because the owner changed several times.

Cartographic Methods

The only method that ensures reasonable rigor in inferring non-extant mercedes from *linderos* is to map grants as area symbols, thereby avoiding assigning the same location more than once. Simpson’s (1952, 28–87) maps assign quantities for each class of grant to each of twenty-nine regions, ranging from 5,250 km² to 48,000 km². Doolittle (1987) usefully converts those regional figures to area symbols in a series of choropleth maps. Those highly generalized maps, produced at the scale of New Spain in order to address a quite different research problem, cannot address the methodological issue of inferring grants at the regional scale, however.

While Simpson’s area-symbol maps date to 1952 and might have stimulated similar projects at regional scales, point-symbol mapping has become the more usual method. Licate (1981, 114–117) maps 68 out of 178 grants for the eastern Mesa Central, with individual point symbols for each grant, but does not differentiate between cattle and sheep estancias. Butzer and Butzer (1993, 93–95) map some 744 estancias for the Bajío, aggregating five estancias per point symbol as well as producing similar, aggregated point-symbol maps for the Mesa Central and the Gulf Coast (Butzer and Butzer 1995). Prem maps grants as point symbols for the western Basin of Puebla, backed up by full references to the documents (Prem 1988, 235–284). Yet none of those point-symbol mappings can address the completeness versus incompleteness of the archival record or the areal extent of the land units because point symbols do not directly relate areal extent to space-time distribution.

Only regional-scale, area-symbol maps can resolve those two methodological issues. Prem (1978, 1984, 1988), by combining archival work at the AGN and local archives with field work and aerial photographic interpretation, maps mercedes as area symbols for 2,000 km² of the western Basin of Puebla, demonstrating the feasibility and utility of an area-symbol approach. Those maps suggest that by 1619, grants for farmland fully occupied much of the bottom land and grants for estancias much of the Popocatepetl and Iztaccíhuatl piedmont (Prem 1988, 137–145, 156–174). Few spatial gaps existed by 1619 except around Atlixco, suggesting recovery of the vast majority of grants for the western Basin of Puebla. Nonetheless, over 91 percent of the some 1250 grants are for farmland rather than livestock, demonstrating little about the de facto areal extent of estancias.

TEST OF THE AREA-SYMBOL METHOD

Despite that variety of methodological precursors, uncertainty persists as to the completeness of the archival record and the areal extent represented by estancia grants. Area-symbol mapping of livestock grants at a regional scale, inspired by Prem's initiative, for the lowlands of central Veracruz provides a deliberate test of that method and begins to resolve that uncertainty.

Central Veracruz Lowlands

As the beachhead for the invasion of Mesoamerica and the entrepôt for the subsequent colony of New Spain, the environs of the port of Veracruz bore the first brunt of the war, the disease, and the livestock; they thus rank high in relevance for understanding the ecological consequences of the introduction of livestock into the New World. Beginning with the first introduction of cattle at Veracruz around 1521, by the end of the sixteenth century these lowlands had become the quintessential cattle range of New Spain and winter pasture for flocks of sheep from the Mesa Central (Chevalier 1952; Simpson 1952; Acuña 1985, vol. 2, 314; Sluyter 1995, n.d.).

Methods

In order to gain a quantitative perspective on that landscape change, seven separate, partial listings of mercedes facilitated recovery of documentation for 228 livestock estancias, with four additional

estancias inferred from mention as linderos (Figure 1). A card catalog to AGN-Mercedes and an unpublished, handwritten "Guía Serie Mercedes" are located at the AGN. The *Catálogo de Ilustraciones* and *Argena* index many sections of the AGN, including AGN-Tierras but not AGN-Mercedes (Catálogo 1979–1984; Argena 1993). A monograph which references copies of grants in the Archivo Notarial de Jalapa (ANJ-Protocolo; Bermúdez Gorrochotegui 1987) and a written communication from K. W. Butzer of May 1993, based on unpublished research notes derived from microfilm copies of the first forty-seven volumes of AGN-Mercedes, proved invaluable. An unpublished, typescript "Guía al Mercedes" became available at the AGN in July 1995.² In addition, LOC-Kraus, ms. 140 and NLC-Ayer, ms. 1121 rewarded folio-by-folio inspection with pertinent mercedes.

Defining the locations of the recovered grants entailed several preliminary operations. Full details

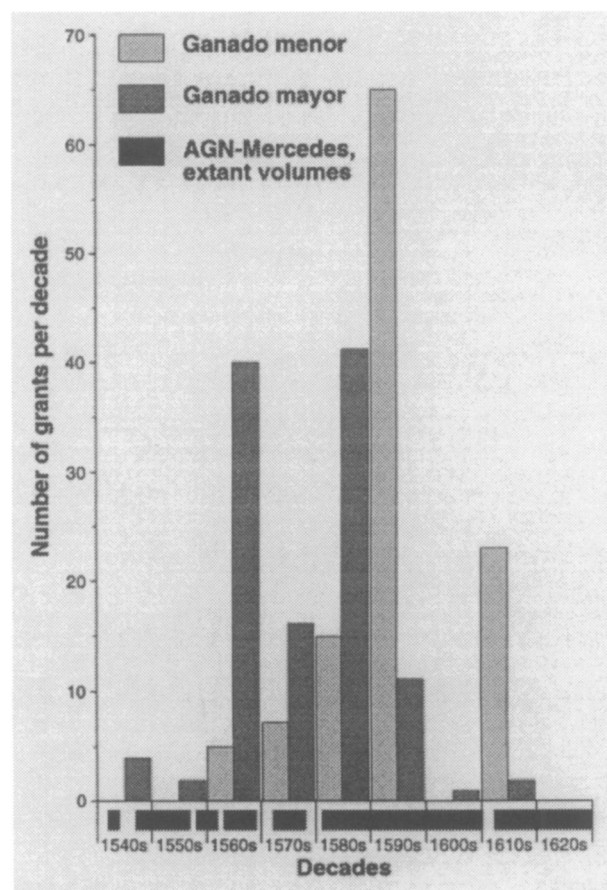


Figure 1. Extant volumes in AGN-Mercedes and grants for cattle and sheep estancias in the central Veracruz lowlands, 1540s–1620s.

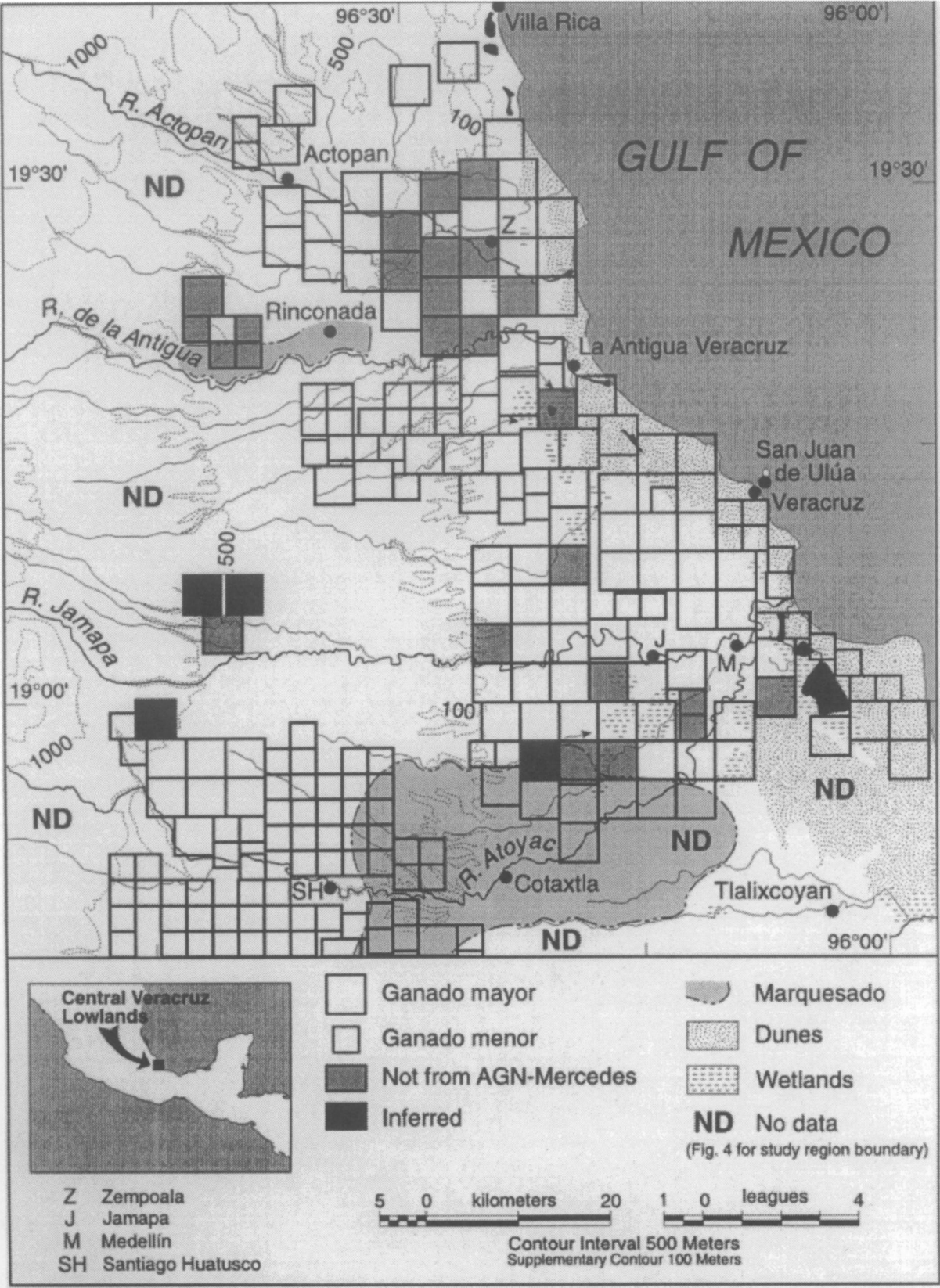


Figure 2. Physiography and grants for cattle and sheep estancias, 1540s–1620s (Marquesado boundaries after Gerhard 1993, 364).

of that paleographic transcription, orthographic and terminological interpretation, paleotoponym reconstruction, and localization of grants bordering the study region appear elsewhere (Sluyter 1995, 373–620). Regarding terminology in specific, because of its importance in localizing estancias, distance references such as *leguas* would have been to “ground” rather than “air distance” and typically would have been to the centers of grants or the planned locations of the *casas y corrales* rather than to estancia boundaries. Like linear measures, references to cardinal directions would have been no more than nominal.

In essence, localizing the estancias with acceptable precision requires spatially reconciling the overall granting pattern (Figure 2). Even so, localization precision varies from grant to grant. At one extreme, the locational details of some mercedes and inspection reports—including boundary lines, extant toponyms, and associated maps—facilitate an individual precision of ± 2 km: for example, the grant to Nicolás de Salazar near Medellín (Figure 3).

...merced a Nicolás de Salazar de dos sitios de estancia para ganado mayor en términos y jurisdicción de la ciudad de La Veracruz entre el río de ella y el de Jamapa, el uno nombrado La Mata de Cordero que está de la dicha ciudad quatro leguas y una de la estancia de Santa Fé hacia la banda del norte y a la parte del sur está el dicho Río de Jamapa una legua poco mas apartado y a la banda del poniente está el dicho sitio que nombran de San Joseph y hacia donde el sol sale está el Cerro de Juan Morrisco, y el otro sitio en la Laguna de Moreno que estará de la dicha ciudad seis leguas y de la estancia de Moreno la cual tiene a la parte del norte una legua poco mas o menos y del pueblo de Medellín que está de la dicha banda del río estará una legua y hacia aquella parte tiene un monte grande al sureste y está apartada de dicho Río de Medellín poco menos de media legua entre la dicha Laguna de Moreno de a donde solía ser el pueblo viejo de Medellín, lo cual... vido Esteban Gómez teniente de alcalde mayor de la dicha ciudad de La Veracruz...

(AGN-Mercedes, vol. 19, f. 81).

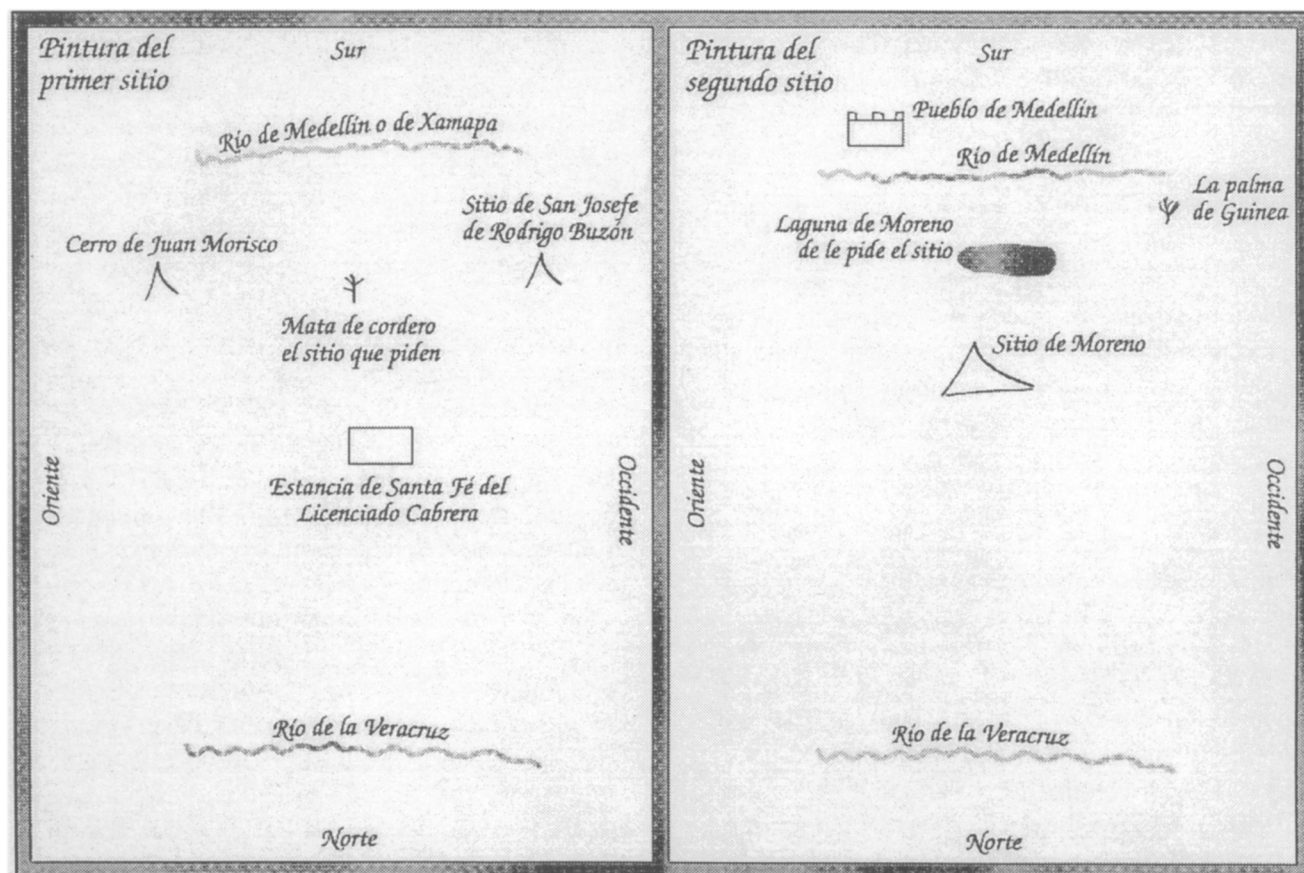


Figure 3. Two maps from 1592 related to a request for cattle estancias (AGN-Tierras, vol. 2764, exp. 15).

Estando arrimado a una laguna que llaman de Moreno tiene un monte grande que hacia el sureste que estará del pueblo de Medellín una legua y de la estancia de ganado mayor que llaman Moreno otro legua la cual dicha estancia de Moreno está a la banda del norte [illegible] de la dicha laguna y ella dicha laguna distará del Río de Xamapa que por otro nombre llama el Río de Medellín a una o media legua y de la palma que llaman de Guinea estará media legua poco mas o menos estando en el dicho lugar que es dos tiras de arcabuz de a donde solía cerca pueblo antiguo de Medellín...

(AGN-Tierras, vol. 2764, exp. 15, f. 189v).

At the other extreme, generic details, lack of extant toponym and landscape referents, and lack of maps lowers individual precision to ± 10 km: for example, the grant to Pedro García del Valle near Guatusco, now Santiago Huatusco.

...hago merced a Pedro García del Valle de un sitio de estancia para ganado menor en términos del pueblo de Guatusco en una sabana rasa junto a un cúe pequeño todo de piedra y encima del están dos árboles uno pequeño y otro grande y junto al dicho cúe están tres o quatro cerrillos pequeños todos de piedra y hacia la banda del oriente está una mata de otates y otros árboles, lo cual...vido Payo Patiño de Avila corregidor de Tequila...

(AGN-Mercedes, vol. 14, ff. 161v–162v).

Overall, the higher precision localizations establish a series of interconnected, local grids which, collectively, more closely define the location of particular, problematic mercedes. The end result is a fair representation, in conceptual terms, of the space-time patterning of land granting—not, by any methodological stretch, a cadastral map.

Results

The earliest livestock in the study region have left few archival tracks, but ordenanzas regarding herding demonstrate establishment of a few informal estancias as early as the 1520s (AGN-Mercedes, vol. 1, ff. 31, 36v; vol. 6, ff. 218v–219; vol. 13, ff. 20–20v; AGN-Tierras, vol. 2764, exp. 17; Paso y Troncoso 1938–1940, vol. 6, 185). Those precocious estancias of the twenties and thirties eventually became absorbed by the formal granting process in the forties and fifties, the operators seeking legal title after several years, even decades, of *de facto* occupation (AGN-Mercedes, vol. 7, ff. 136–136v).

The forties and fifties represent a transitional period, characterized by granting of *de jure* title lagging *de facto* occupation, increasingly effective control of space under the first viceroy (Antonio de Mendoza, 1535–1550), a diversifying economy, and the policy of the second viceroy (Luis de Velasco I, 1550–1564) to shift cattle ranching out of the more densely populated highlands (Chevalier 1963, 100). The cattle estancias cluster in the environs of La Antigua Veracruz and Zempoala except for one grant on the southern margin of the study region near Santiago Huatusco (Figure 4). The coastal plain, open savanna on vertisolic plains interrupted by streams and wetlands, made for prime cattle pasture. Just as importantly, the *camino real* from La Antigua Veracruz through Rinconada and on to Jalapa and Mexico City provided access to the developing urban markets of the Mesa Central.

The flood of granting during the sixties was a response to development of silver-refining technology and the beginning of the mining boom, the consequent and exponentially increasing immigration from Spain, and the parallel growth of the flesh-eating populations of Mexico City and Puebla. The land rush stretched the length of the narrow coastal plain. Some of the grants might have formalized estancias that had been in existence for a decade or more. The five sheep estancias probably supplied the local and naval mutton markets, two of them being near the slowly growing port of San Juan de Ulúa, at present-day Veracruz. The sand dunes of the coast rather than the wetlands of the coastal plain made the better sheep range; wet pastures encourage sheep parasites and infectious diseases, especially foot rot (Gatenby 1991).

A relative hiatus during the seventies reflected a change in viceroy (Martín Enríquez, 1568–1580) and in policy, responding to suites by Native communities throughout New Spain against livestock damages to their agricultural fields (Chevalier 1963, 93). Much of the granting that did occur filled in the interstices between existing estancias in the prime zones of the coastal plain. But granting for both *ganado mayor* and *ganado menor* also occurred in the environs of Santiago Huatusco. That latter activity might reflect early speculation regarding the possibility of a new *camino real* from Veracruz to Puebla through Orizaba (Rees 1975; Driever 1991).

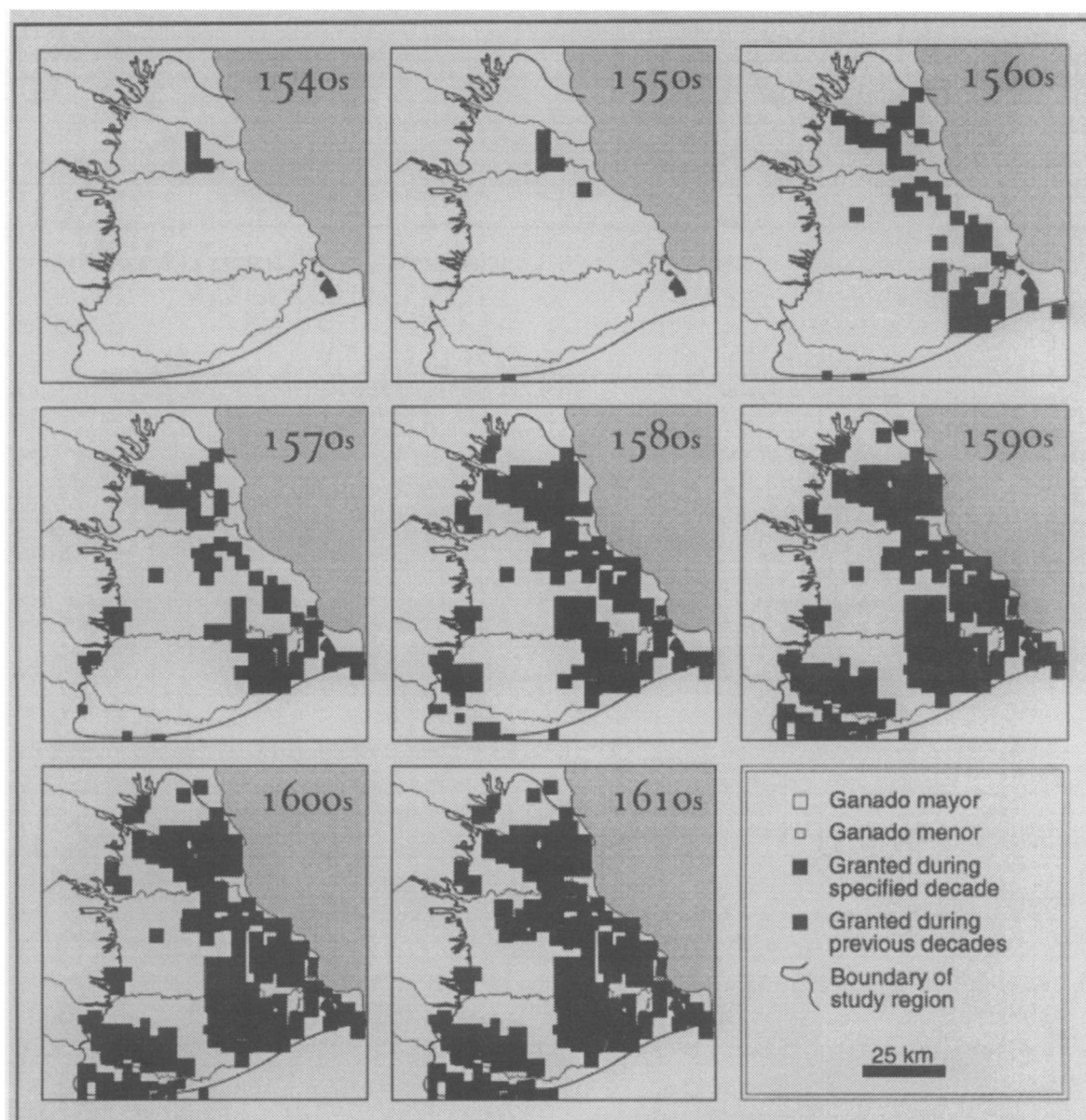


Figure 4. Grants for cattle and sheep estancias by decade, 1540s–1610s.

The eighties saw renewed granting as the Native population throughout New Spain approached its nadir after the epidemics of the seventies, resulting in vacant land, reduced food supplies, inflation, and high food prices (Chevlaier 1963, 104). In part, the flurry of mercedes around Santiago Huatusco probably relates to continued speculation over the southern camino real. Estancias along the new route would have ready access to the domestic market for meat, wool, hides, and tallow and to the export market for hides, 150,000 leaving through Veracruz in 1598 alone (Chevalier 1963, 106–107). The vertisolic savanna plains northwest of Santiago

Huatusco comprised the prime range, co-opted for cattle estancias.

The land rushes for sheep estancias, in the 1590s and 1610s, represented the continuing growth of the textile industry (Chevlaier 1963, 107; Salvucci 1987, 135–136) and the need for lowland, winter pasture as the flocks of the Mesa Central pressed the limits of the highland carrying capacity (Melville 1990). Most of those grants again focused on the piedmont near Santiago Huatusco, but generally on more dissected terrain than the plains to the northwest. Sheep grants also filled the dunes near the by then booming port of Veracruz, eventually transferred

from La Antigua Veracruz to San Juan de Ulúa circa 1600. Many of those grants probably represent dry-season *agostadero* for sheep from the Mesa Central (Sluyter 1995, 281–282). Most of the good cattle pasture of the coastal plain had been occupied by the 1580s, but filling in continued during the 1590s, with interstices too small for ganado mayor estancias granted as ganado menor. During the 1610s, a lagging rush for sheep grants spread up the central piedmont, relatively near the northern camino real and with good access to the Mesa Central but not as ideally situated as the Santiago Huatusco zone.

The effective cessation of granting during the 1620s reflected the decline in silver production, modest population growth, and deepening stagnation of the previous century of economic growth (Gibson 1966, 103–105). And the landscape was full. By 1619, some 2,950 km² of estancias occupied more than 50 percent of lowland central Veracruz and nearly all of its prime range. Only the Cotaxtla and Rinconada enclaves of the Marquesado del Valle, the central piedmont, and buffers around Spanish and surviving Native communities remain as blanks on the map.

DISCUSSION AND CONCLUSIONS

Regarding the issue of completeness of the extant record, the rhythm of the granting process evident in the extant mercedes is real, a function of changing political and economic context rather than an artifact of “lost” volumes of mercedes. First, the temporal gaps in AGN-Mercedes do not particularly correlate with the ebbs and flows of granting (Figure 1). Second, only the Cotaxtla and Rinconada enclaves of the Marquesado del Valle and the central piedmont remain as significant blanks on the map by 1619 (Figure 2). The former blank reflects occupation by censos rather than mercedes in the Marquesado; the grants that do intrude on the Marquesado largely date to the long period of sequestering and viceregal control, from 1567–1593 (Sluyter 1995). The latter blank relates to the inaccessibility of the central piedmont, the difficulty of north-south movement in a zone dissected by *barrancas* and the distance from the caminos reales to the north and south. Of the total of 232 estancias mapped, only four represent inference from mention as linderos and only twenty-five exclusively derive from repositories other than AGN-Mercedes. Given the space-time pattern

evident in the area-symbol maps, the spatial distribution of grants in 1619 confirms that all of the precocious estancias of the 1520s–1530s eventually absorbed into the formal granting process and that no significant spatial lacunae match the temporal lacunae in AGN-Mercedes (Figure 4). The patterning also suggest that Spanish space accumulation largely proceeded through viceregal granting rather than through other processes, such as purchase from Natives or “squatting.” Thus, accounting for putative “lost” mercedes by interpolation, adding 40.5 percent to cattle estancias and 25 percent to sheep estancias (Simpson 1952), is unjustified—at least for the central Veracruz lowlands. Similarly, accounting for putative “squatters” by inference from linderos, adding more than 100 percent to the total estancias (Melville 1983), is unjustified—again, at least for the central Veracruz lowlands.

Regarding the areal extent of the land units, the de jure areas of 1,747 ha for ganado mayor and 776 ha for ganado menor represent a close approximation of reality. The blanks among the densest groups of estancias might represent a few missing mercedes but more likely represent the difference between the conceptual and the operational, the neighboring estancias and a scattering of farms, or *caballerías*, co-opting the interstices. The Spanish and surviving Native communities also retained minimal buffer zones, accounting for other interstices. Nonetheless, in no case could any estancia have been “surrounded by a belt of open land at least double the size of the piece granted” and thus justify multiplying the de jure areal extent by three (Simpson 1952, 21). To varying degrees in space and time, the central piedmont did serve as common range during the wet season, the cattle retreating to their home estancias on the coastal plain during the dry season (Sluyter n.d.). But that seasonal round between piedmont and coastal plain does not equate with Simpson’s hypothesized buffer zone around each estancia, and understanding the environmental implications of such transhumant ecologies will require analysis of the stocking rates of the estancias and of the changing patterns of land ownership (Sluyter 1995, 621–653, 659–675).

In conclusion, the localization and area-symbol mapping of land grants addresses two of the most persistent methodological issues regarding archival

analysis of landscape ecological change.³ The method, at least for the lowlands of central Veracruz, demonstrates that the extant grants represent a fairly complete record and that the de facto dimensions of the estancias fairly closely reflected the de jure dimensions. While, arguably, the distinct environmental and cultural contexts of other regions, particularly in the highlands of New Spain, might have resulted in different processes of space accumulation than those of the study region, only further research can demonstrate those differences. Most essentially, that research will employ spatial, cartographic methods.

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NOTES

1 Although Lesley Byrd Simpson, Sherburne F. Cook, and Woodrow Borah have made many seminal contributions to our understanding of Latin American history and might be characterized as "The Berkeley (History) School," only Borah held an appointment as an historian, Cook being a physiologist and Simpson being a literary scholar.

2 Full references to and, in many cases, transcriptions of relevant documents appear elsewhere (Sluyter 1995). Continued archival work since the dissertation work has recovered additional mercedes, totaling one cattle estancia and twenty-three sheep estancias (AGN-Mercedes, vol. 15, ff. 182v–183v; vol. 16, f. 27v; vol. 17, ff. 25v–26v; vol. 18, ff. 373v–374; vol. 19, ff. 130–131, 133v–134v; vol. 20, ff. 112v–114v, 117–120v, 141–142, 182–182v; vol. 29, ff. 139–139v). Some of that additional recovery has been on the basis of the new "Guía al Mercedes" and some on the basis of the renewed availability of several volumes which had long been under restoration or *en copias*.

3 Clearly the localization of sixteenth-century land grants might also address issues other than ecological change per se, issues which remain beyond the scope of this particular contribution but include, for example, the emergence of the *hacienda* (cf. Lockhart 1969; Mörner 1973; Frank 1979; Van Young 1983; Florescano 1987). If hacienda historiography has produced no definitive answers, hacienda geography barely exists. Magnus Mörner offered an insightful prescription more than two decades ago: "To understand the role and development of the haciendas, it seems even more important to place them, or the entire agrarian structure in a certain district, in an ecological context and to determine the cartographical dimensions through time.... It would seem that interdisciplinary teamwork between historians and geographers, rural sociologists or other social scientists would often be the rational solution" (Mörner 1973, 215–216). In contrast to the original grazing licenses of the 1520s–1530s, which conceived pasture as usufruct, the mercedes implied an award of inheritable private property (Chevalier 1963, 87–97).

However, without royal ratification of those viceregal awards—never to materialize during the sixteenth century—the mercedes remained but dubious land titles (Chevalier 1963, 16, 264–265). The period of *composición* during the seventeenth century, when the crown finally ratified the mercedes, reached a peak during the 1630s–1640s (McBride 1923, 56–57; Recopilación 1987, libro 4, título 12, leyes 15–21; Prem 1988, 1992; e.g., AGN-Mercedes, vol. 45, ff. 135–137v). At the same time, *composición* allowed those few colonists with capital to subsume many small holders, including Natives (McBride 1923, 58; Chevalier 1963, 266–277). With *composición*, space legally came under the control of a minority of individuals and the haciendas came into being. Just as central to geographical research as those social and economic themes, the emergence of the hacienda from the estancia connoted an ecological transformation. After *composición*, stipulations regarding land use became as superfluous in law as they, at least in some cases, might already have been in fact: the transformation of estancias into haciendas implies that owners legally began to decide land use irrespective of original grant designations as ganado mayor, ganado menor, or caballería (e.g., AGN-Mercedes, vol. 37, ff. 80v–81v).

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RESUMEN.

A pesar de la riqueza de datos en archivos Mexicanos pertinentes a la comprensión de la interacción entre el ganado y el cambio ecológico durante el siglo XVI, algunos puntos metodológicos fundamentales persisten en el uso de los documentos de la tenencia de la tierra, o las mercedes. Ambos el grado de preservación del registro de mercedes y la extensión de la superficie de los estancias para ganado mayor y ganado menor permanecen inciertas. Un método cartográfico que emplea datos de las tierras bajas del centro de Veracruz elucidó esos puntos y sugiere un método general para el análisis riguroso de las mercedes. El método demuestra que las mercedes existentes representan un registro casi completa y que las extensiones de las superficies de las estancias bastante estrechamente reflejó las estipulaciones legales.